

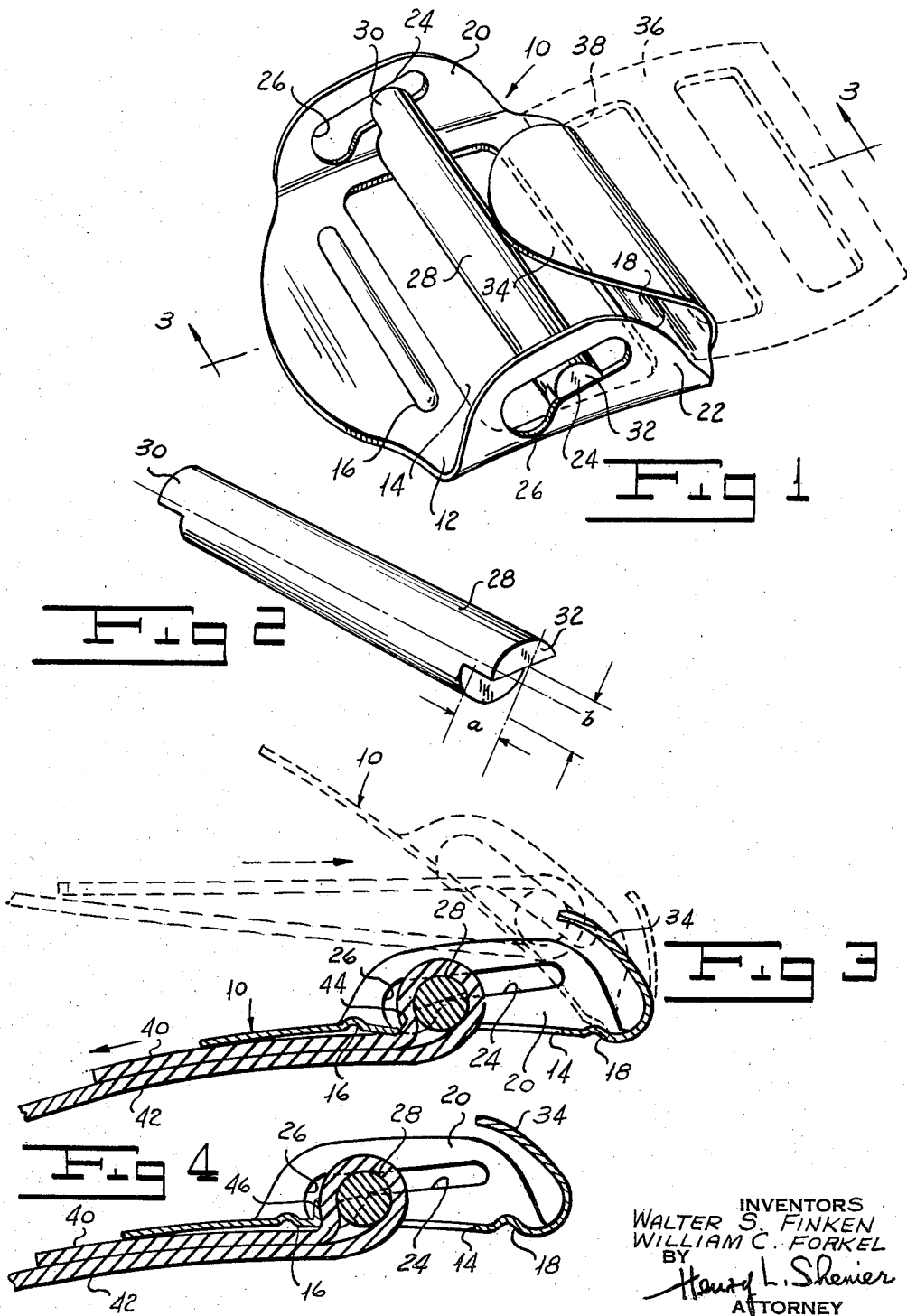
Jan. 5, 1960

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ADJUSTABLE BUCKLE

Filed Nov. 14, 1955



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ADJUSTABLE BUCKLE

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Application November 14, 1955, Serial No. 546,438

3 Claims. (Cl. 24—196)

Our invention relates to an improved adjustable buckle and more particularly to an improved adjustable buckle which employs both cinching and compressive action to retain the free end of a belt in its adjusted position.

In the prior art attempts have been made to snub the free end of a belt securely while permitting ready adjustment of the length of the belt. Buckles of the prior art for adjustably securing a free belt end include a slotted frame with a bar, or the like, positioned over the slot. The free belt end passes through the slot, over the bar, and back down through the slot. Tension on the belt snubs the free end by a cinching action provided by the frictional engagement of the length of belt leading to the free end with the belt proper. This cinching action creates forces on the bar ends with the result that the load applied to the belt is absorbed largely by the bar with bending moment, rather than directly by the relatively strong frame body. In these buckles of the prior art, the bar must be relatively critically positioned with respect to the thickness of webbing, or the like, forming the belt in order that a secure cinching action with no slippage be provided. By properly positioning the bar, the cinching force may be made relatively great. We have found, however, that the greater this cinching force, the more difficult becomes adjustment of the belt. Further, in many buckles of the prior art the belt is drawn over a sharp edge in providing the cinching action, with the resultant danger of cutting the material, such as webbing, making up the belt.

One object of our invention is to provide an improved adjustable buckle which secures the free end of a belt in adjusted position by reason of a combined cinching and clamping action.

A further object of our invention is to provide an improved adjustable buckle, the bar of which is subjected to compressive forces.

Yet another object of our invention is to provide an adjustable buckle adapted to receive various thicknesses of webbing.

A still further object of our invention is to provide an improved adjustable buckle affording ready adjustment of the effective length of the belt with which our buckle is used.

A further object of our invention is to provide an improved adjustable buckle in which the material forming the belt with which our buckle is used is not subject to cutting action.

Other and further objects of our invention will appear from the following description.

In general, our invention contemplates the provision of an improved adjustable buckle including a frame formed with an opening providing a surface against which the free end of a belt is to be clamped. Means carried by the frame slidably support a bar around which the belt passes for movement toward the clamping surface to snub the free end of the belt when tension is applied to the belt. The bar mounting means permit sliding

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movement of the bar in clamping the belt to subject both the bar and the belt to compressive forces while substantially reducing the forces applied to the ends of the bar. Our buckle relies both on cinching and compression in securing the free end of the belt in its adjusted position. An increase in tension on the belt merely increases the compressive force to which the belt is subjected. The bar mounting means permit rotary movement of the bar in response to tension on the free end of the belt to free the belt of the compressive force to permit adjustment of belt length. A similar action releases the belt when the frame is rotated with respect to the frame.

In the accompanying drawings which form part of the instant specification and which are to be read in conjunction therewith and in which like reference numerals are used to indicate like parts in the various views:

Figure 1 is a perspective view of one form of our improved adjustable buckle.

Figure 2 is a perspective view of the bar of our improved adjustable buckle.

Figure 3 is a sectional view of the form of our improved adjustable buckle shown in Figure 1 with a belt in place, taken along the line 3—3 of Figure 1, showing the belt releasing position in broken lines.

Figure 4 is a sectional view of a modified form of our improved adjustable buckle.

More particularly, referring now to the drawings, our buckle includes a frame, indicated generally by the reference character 10, having a base 12 formed with a rectangular opening 14. Opening 14 is reinforced along a pair of its sides by respective bosses 16 and 18 stamped in base 12.

We form a pair of respective bar mounting ears 20 and 22 on the sides of frame 10. Each of the ears or flanges 20 and 22 is formed with an inclined slot 24 having an enlargement at one end.

Referring now to Figure 2, the bar 28 of our adjustable buckle preferably is formed from a cylindrical steel rod. Each of the respective ends 30 and 32 of bar 28 is milled for a distance a in the direction of the bar axis and for a distance b radially inwardly, where a is a distance along the bar axis from the end 32 to a surface perpendicular to the bar axis and where b is a distance along a diameter perpendicular to the plane of the under surface of end 32. When the bar 28 is assembled on frame 10, the under surfaces of ends 30 and 32 ride on the lower edges of slots 24 in the respective ears 20 and 22. The distances a are sufficiently great that the length of the bar 28 between the ends 30 and 32 is less than the width of slot 14. Owing to this construction, the portion of bar 28 between ends 30 and 32 may ride into the opening 14. Preferably, the distance b is greater than the radius of a cross section of bar 28.

We form frame 10 with a tongue 34 folded back over the base 12. When our buckle secures a belt, a complementary buckle member 36 (shown in broken lines) formed with a slot 38 is slipped over tongue 34. It will be appreciated that the belt end remote from the free end of the belt with which our buckle is used is fixedly secured to member 36 in any appropriate manner. We extend tongue 34 a distance back over base 12 to prevent the members from accidentally becoming unhooked.

The free end 40 of the belt 42 with which our buckle is used passes through opening 14 over bar 28 and back down through the opening 14. When tension is applied to the standing part of the belt 42, bar 28 slides down slots 24 toward the side of opening 14 adjacent boss 16. This side of opening 14 provides a surface 44 against which the belt rests. As the ends of bar 28 approach the enlarged portions 26 of slots 24, they force the length of belt 42 extending from

free end 40 into engagement with surface 44. Before the ends 30 and 32 reach enlarged portions 26 of slots 24, the dimension of the slots prevents rotation of the bar. As the ends enter the enlarged portions 26, bar 28 compresses the length of belt against surface 44. The stamped boss 16 adjacent the surface 44 provides a means for absorbing this compressive force. It is to be noted that surface 44 is rounded. The portion of frame 10 between embossment 16 and surface 44 is bent slightly downwardly below the undersurface of frame 10. We have found that this construction substantially reduces the forces applied to the ends of bar 28 during its travel down slots 24 before it reaches enlarged portions 26. When our bar 28 is in clamping position, it is subjected largely to compressive forces. It will be appreciated that these forces are transmitted through the belt to the buckle base, with the result that the belt tension is not absorbed mainly by bar 28, as it is by the bars of buckles of the prior art. Our buckle relies not only on this compressive force on the length of belt extending from free end 40, but also relies on the cinching action provided by the frictional engagement between the length of belt extending from the free end 40 and the belt proper 32, owing to the fact that the surface 44 is below the axis of the bar 28.

In the form of our invention shown in Figure 4, we form the side of opening 14 adjacent boss 16 with an upwardly extending lip or flange 46. Lip 46 is formed with a triangular cross-section, rounded at its apex. This lip increases the surface area of belt 42 to which the compressive force is applied by bar 28. This construction reduces any residual cutting action by the compressive force on the belt 42.

In use of our improved adjustable buckle, one end of a belt 42 is secured by sewing, or the like, to buckle member 36. The other, or free end 40, of belt 42 is passed through opening 14 over the bar 28 and back down through the opening 14. Member 36 is hooked over tongue 34. The girth may be readily adjusted by pulling on free belt end 40, as will be explained hereinafter. When tension is applied to the belt 42, the ends of bar 28 slide down slots 24 to the left, as viewed in the drawings, to approach enlarged slot portions 26. As the bar ends 30 and 32 enter the enlarged portions 26, the length of belt extending from free end 40 is forced against surface 44. Entry of the ends 30 and 32 into enlarged portions 26 permits bar 28 to clamp the length of belt extending from free end 40 against surface 44. This action substantially reduces the forces applied to the ends of bar 28 and provides a high compressive force on the belt 42. Our buckle also provides a cinching action owing to the frictional engagement between the length of belt extending from free end 40 and the belt proper 42. An increase in tension on belt 42 tends to rotate bar 28 in a clockwise direction as viewed in Figure 3. This rotation is prevented by the portions of slots 24 preceding enlargements 26. As a result, the bar 28 tends to slide further to the left to increase the compressive force on the belt.

When it is desired to reduce the effective length of the belt, the free end 40 is pulled. Application of a pulling force on end 40 in the direction of the solid arrow in Figure 3 rotates bar 28 in a counterclockwise direction as viewed in Figure 3 to release the belt and permit free end 40 to be drawn in the direction of the arrow. This action shortens the effective belt length.

When the belt is to be released, the left end of frame 10, as viewed in Figure 3, is grasped and moved to rotate frame 10 to the broken line position shown in Figure 3. This action is in effect a relative rotation of bar 28 in a counterclockwise direction with respect to frame 10, as viewed in Figure 3. The bar enters the enlargements 26 to release the belt length from the compressive force exerted by the bar. The belt cinching action also ceases, since the belt proper 42 and the belt length

leading to free end 40 are out of engagement with each other. Thus, in this position the length of belt extending to free end 40 readily passes over bar 28 in the direction of the arrow shown in broken lines in Figure 3. Frame 10 may be moved to the broken line position shown in Figure 3 to permit an increase in the effective length of the belt 42. It will be appreciated that our improved adjustable buckle accommodates a wide range of thickness of belt forming material, such as webbing or the like.

It will be seen that we have accomplished the objects of our invention. We have provided an improved adjustable buckle which secures the free end of a belt by combined clamping and cinching action. The bar of our buckle is subjected largely to compressive forces. The forces on the ends of the bar are substantially reduced when the bar is in clamping position. The load applied to our buckle is absorbed largely by the buckle frame, rather than substantially entirely by the buckle bar. Our buckle does not subject the belt to cutting action. It accommodates a wide range of thickness of belt and permits ready adjustment of the belt length.

It will be understood that certain features and sub-combinations are of utility and may be employed without reference to other features and subcombinations. This is contemplated by and is within the scope of our claims. It is further obvious that various changes may be made in details within the scope of our claims without departing from the spirit of our invention. It is therefore to be understood that our invention is not to be limited to the specific details shown and described.

Having thus described our invention, what we claim is:

1. An adjustable buckle for securing the free end of a belt including in combination a frame formed with an opening through which said belt passes, said opening having a wall providing a surface against which said belt is to be compressed, a bar around which said belt extends and means mounting said bar for movement from a position remote from said surface to a position adjacent said surface to compress said belt against the surface when said belt is under tension, said mounting means and said bar comprising first coacting interengageable means for restraining said bar against rotary movement as said bar moves from said remote position to a position adjacent said surface, said mounting means and said bar comprising second coacting means disposed adjacent said surface for permitting rotary movement of said bar to free said belt when tension is applied to said free end.

2. An adjustable buckle for securing the free end of a belt including in combination a frame formed of an opening through which said belt passes and having a wall which provides a surface against which said belt is to be compressed, a bar having ends, said belt extending around said bar, mounting means comprising means carried by said frame forming a pair of slots having first portions inclined toward said surface and having enlarged portions adjacent said surface for supporting said bar on said frame for movement from a position remote from said surface to a position adjacent said surface, said mounting means comprising first coacting means including said first slot portions and means formed on said bar ends for restraining said bar against rotary movement as said bar moves from said remote position to a position adjacent said surface and second coacting means comprising said means formed on said bar ends and said slot enlarged portions for permitting limited rotary movement of said bar when the bar is adjacent said surface and tension is applied to said free end to free said belt.

3. An adjustable buckle as in claim 2 in which said means formed on the bar ends comprise flattened portions adapted to ride along the bottom edges of said slots, said flattened portions having a maximum cross-sectional dimension which is less than the width of said slots at

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said enlarged portions and which is greater than the width of said first slot portions.

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